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FRONT COVER: *River Dochart in Scotland, by John Brooks (Nobel Division)*

OUR CONTRIBUTORS

A. H. ALLSOPP *is an accounts clerk at the Witton Distribution Centre of Metals Division. He is a fluent linguist (French, Spanish, German and Portuguese) and has travelled widely in France and Spain.*

F. M. S. HARMAR-BROWN *works in Central Publicity Department. He has collaborated with Arthur Horowicz over several articles in the past. His gifts of clear writing combined with his training as an engineer enable him to explain technical processes in simple language.*

GEORGE ORDISH *is an entomologist working for Central Agricultural Control on a survey of agricultural chemicals. He lived for many years in the wine-growing area of France and has just published a book called* Wine-growing in England.

F. G. STEVENS *is an official of the Ministry of Agriculture whose work has brought him for many years into close contact with I.C.I. His daughter at one time worked in Plastics Division.*

HARVEST FROM THE SKY

The story of the manufacture of synthetic ammonia

By F. M. S. Harmar-Brown

The life-blood of Billingham is synthetic ammonia, which provides the main raw material for some 20 different chemicals to the value of many millions of pounds a year. Yet the constituents of ammonia are derived from nothing more than air and water. Here is an account of this remarkable triumph of chemistry, now in its thirty-first year.

Illustrated by Arthur Horowicz

To most of us ammonia is a cloudy, pungent liquid sold in small bottles for rather vague household purposes that include the revival of those on the point of fainting.

In fact it is a very valuable chemical raw material. At Billingham alone it is used in the manufacture of all three of the fertilizers—sulphate of ammonia, 'Nitro-Chalk,' and concentrated complete fertilizers—which make up such a large part of the Division's output; and it is equally important as a raw material in the processes producing nitric acid, ammonium nitrate (some of which is used for blasting explosives), urea for plastics and, last but by no means least, the nylon produced by the Billingham factory of Dyestuffs Division.

Pure ammonia is a chemical compound of one part nitrogen to three parts hydrogen, and it is ironical that it should be so difficult to make when its constituents come from nothing more than wind and rain. The air we breathe is mostly nitrogen, while water—which is common enough—contains hydrogen. In each case, however, the wanted gas is associated with oxygen: air is a mixture of nitrogen and oxygen, while water is a compound of hydrogen and oxygen (H_2O). At Billingham the first step is to take air and water and get rid of the oxygen, which is made to combine with carbon in the form of coke.

Billingham makes its own coke for this purpose, at the rate of 1000 tons a day, by roasting coal in a battery of coke ovens. The ovens are long, narrow corridors of silica brick heated by gas burners. There are at present sixty of them, though more are being built, and they are filled and emptied in rotation.

Emptying—or "pushing," as the experts would have us say—is particularly impressive. When the coal is done to a turn, or fully converted into coke, a kind of mobile battering ram rolls into position. Steel fingers release the oven door and swing it to one side. When everything is ready, the driver of the ram moves a lever and the ram drives steadily into the oven, pushing a flaming, tumbling cascade of red-hot coke into a receiving truck.

The coke is then run to what is virtually a huge shower-bath at the end of the oven building and there quenched with water. Hissing, billowing clouds of steam roll skywards—a delight to the spectator. The quenched coke is then dropped on to a conveyor which carries it to the next stage of the process—the Water Gas Plant.

The Water Gas Plant consists of twenty large cylindrical vertical generators set in a huge three-storied building. The coke is fed in at regular intervals at the top storey and the ash withdrawn at the bottom. A fire burns continuously in the centre of each generator, being alternately fanned to a bright red heat by blasts of air and damped to a dull glow by blasts of steam.

What happens is this. During the air blast we have a mixture of nitrogen and oxygen passing over red-hot carbon, so according to the textbook the oxygen combines with the carbon to give both carbon monoxide and carbon dioxide, releasing at the same time nitrogen for ammonia. Then when the steam is blown in, the oxygen in it combines with the carbon to give carbon monoxide, and we get a mixture of carbon monoxide and hydrogen coming off into the gas main, providing the hydrogen for ammonia.

A Billingham Speciality

However, the idea of making ammonia on its own is far too simple for the plant designers at Billingham. They are also after high-pressure hydrogen as well as ammonia. So by a system of automatic hydraulic valves they arrange the working of the water gas generators to give two different product gases, which are collected in separate large gas-holders. These gases are commonly referred to as H or hydrogen and N or nitrogen gas.

Let us follow the N gas, which is the one chiefly used to make ammonia. It consists of nitrogen, hydrogen and carbon monoxide. First of all this gas is purified of sulphur compounds (which originate from the coal) and then passed to a plant where the carbon monoxide undergoes a chemical reaction with steam. In this reaction the carbon monoxide combines with the oxygen in the steam to become carbon dioxide, thus releasing hydrogen from the steam. This is done in the presence of a catalyst, which speeds up the rate at which the chemical reaction takes place.

Mixed Gases

As a result of this the N gas now consists of a little under one-half hydrogen, one-fifth nitrogen, one-third carbon dioxide, and a trace of carbon monoxide. At this stage it leaves the jurisdiction of the Gas and Power Works and enters a gas-holder, from which it is taken to the Ammonia Works proper.

In the first of the vast buildings of the Ammonia Works the big squeeze begins. The reason for the squeeze is that the hydrogen and nitrogen in the gas object to combining to become ammonia except under very high pressure.

Sleek 5000 h.p. rotary compressors, driven by steam

PUSHING THE COKE. *Twelve tons of red-hot coke, pushed by a ram at the far end of the oven, are here cascading into the electrically driven coke car. Still glowing fiercely, the coke is thus transported to the quenching tower, where it is cooled with water before being fed to the gas plant.*

turbines, gulp in the gas through 5 ft. pipes and squeeze it to 10 atmospheres pressure. From there it passes to an even larger building, where a row of towering majestic vertical reciprocating piston compressors (also turbine-driven) boost it up to 50 atmospheres—about three times the pressure in the boiler of a railway locomotive.

These big piston compressors, each higher than the average house, are a fine sight with their swinging flywheels and the inexorable swift surging of their smooth, polished connecting rods.

There is going to be a much bigger squeeze yet, but at this stage it is expedient to remove the carbon dioxide. This is done by allowing the gas to bubble through water in absorption towers, whereupon, at this high pressure, the carbon dioxide dissolves in the water to form a sort of super-soda-water. It all sounds very easy, but do not forget that it is being done at 50 atmospheres pressure.

THE NERVE-CENTRE OF THE WHOLE GAS-MAKING SYSTEM, *where an operator regulates the flow and mixing of the gases from which ammonia and other products are made.*

Some 4500 *tons* of water per hour are needed, and of course it all has to be pumped up to this high pressure before it can be mixed with the gas. This calls for a sizeable pumping station, but some of the energy is recovered by allowing the carbon-dioxide-charged water to drive water turbines during the let-down back to the pressure of the atmosphere. Naturally it fizzes fiercely inside the turbines and the carbon dioxide has to be collected from the turbine casings, but Billingham engineers have solved all those problems.

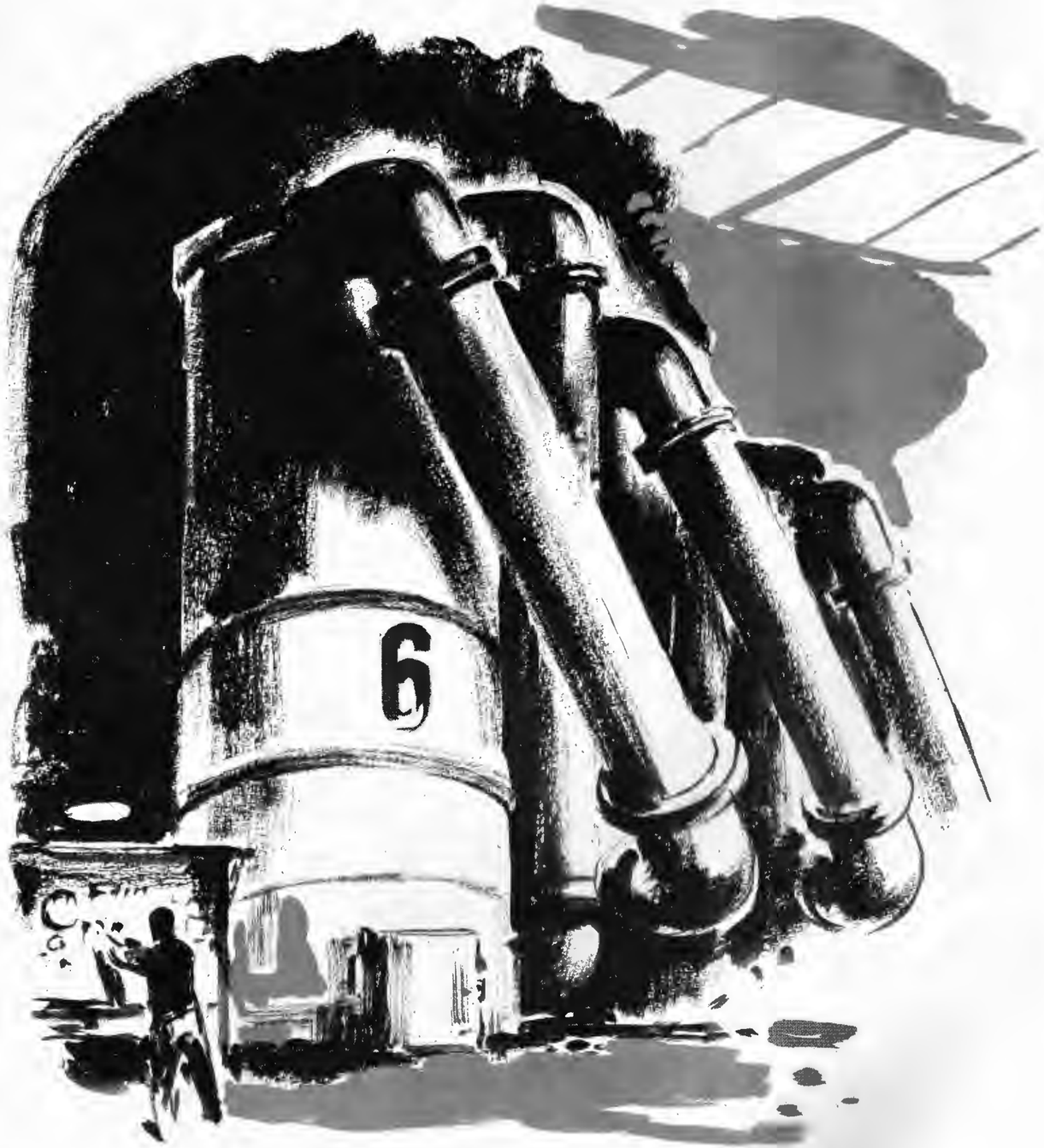
Now comes the final squeeze. A second row of vertical compressors takes the gas and rams it up to 260 atmospheres. This may be quite small beer to the polythene experts, with their fantastic pressures running into thousands of atmospheres, but it is nevertheless quite a boost—calling for steel tubes with walls an inch thick, for example.

At this stage extra hydrogen is fed in from the compressed and purified H gas to bring the hydrogen/nitrogen ratio to 3 : 1. Then the carbon monoxide is removed. This also is done in absorbers, but this time a special chemical liquid has to be used instead of water.

Now at last we have a mixture of hydrogen and nitrogen in the right ratio and at the right pressure to make ammonia. The mixture is led—still through those startlingly thick steel pipes—to the synthesis plant, and here, after a final purification, it enters the ammonia convertors.

These massive steel vessels form a towering row. Each weighs 100 tons, and some idea of their general scale and strength can be gathered from the fact that a single nut from a bottom flange is more than two men can lift! Inside the convertors is a maze of pipes, and the gas passes round and round—again over a catalyst. At each pass ammonia is formed, and is removed while more of the gas mixture is fed into the circulating system for conversion.

Some of the ammonia is stored and loaded into tank wagons for sale, but most of it is distributed, as gas or liquid or dissolved in water, to other chemical plants all over Billingham.



THE HUGE SILENT TOWERS OF THE HYDROGEN PLANT *range one beyond the other in a vast building 500 ft. long. Here the proportion of hydrogen in the gas mixture is increased by reacting the carbon monoxide with steam over a catalyst. The carbon monoxide (CO) combines with the oxygen in the steam (H_2O) to make carbon dioxide (CO_2), thus releasing hydrogen (H).*

ONE OF THE TWELVE GIANT RECIPROCATING COMPRESSORS *driven by a steam turbine which rams the mixture of hydrogen and nitrogen gas up to a pressure of 260 atmospheres. These compressors are 50 ft. high and weigh over 200 tons each. Under their enormous pressure the nitrogen and hydrogen are made ready to combine together to form ammonia.*

Information Notes

THE IMPORTANCE OF NATURAL GAS

(Contributed by Wilton Works)

Last February it was announced that I.C.I. had discovered in North Yorkshire a substantial quantity of natural gas, sufficient to raise hopes of commercial exploitation. Here is the story of the why and wherefore of natural gas and of its potentialities.

You may wonder why the Company should spend time and money hunting for natural gas. The short answer is that natural gas, as well as being a valuable fuel, is a potential raw material for the chemical industry.

Natural gas is just that—a gas, much the same as the gas used in gas cookers, but instead of being made by man in a gasworks it occurs naturally in the ground. A borehole sunk at the right spot enters the gas reservoir, and the gas can then come to the surface.

Natural gas occurs in porous sedimentary rocks, of which limestone is a good example. A mechanical trap is required if the gas is to accumulate. The sedimentary rocks were initially horizontal, since the material of which they are made was deposited on the bottom of the sea. Some of the deposits were porous, like limestone, and some were not, like clays and anhydrite.

Much later, after the rocks were consolidated, earth movements occurred so that the rocks were squashed endwise and folded into hills and valleys. With the right conditions, the hills were the places where gas might accumulate. The hill would form a large dome of porous rock covered with a cap of impervious rock. The gas is light and would rise into the dome and be trapped there. Water in the lower levels would seal the edges. The dome, in fact, would serve as a giant gasholder just as a water-sealed gasholder does in a gasworks.

Natural gas sometimes occurs by itself, as in North Yorkshire, but more often it is associated with oil deposits, as in Persia and America. Oil and gas seepages occur at the surface in many parts of the world and have been known for centuries. In Persia the followers of Zoroaster were fire worshippers who looked with awe on the natural gas fires in their country as manifestations of divine power.

The composition of natural gas is variable. It may be a "dry" gas consisting of the simplest hydrocarbons, for example methane. The gas in North Yorkshire is of this simple type. Or it may be a "wet" gas, that is one containing hydrocarbons that liquefy easily and can be stripped from the gas and recovered as petrol. The gas may also be "sweet" or "sour"—the latter means that gaseous sulphur compounds (mainly hydrogen sulphide) are present and have to be removed because they are corrosive. They are a nuisance, but they can be useful sources of sulphur as a by-product.

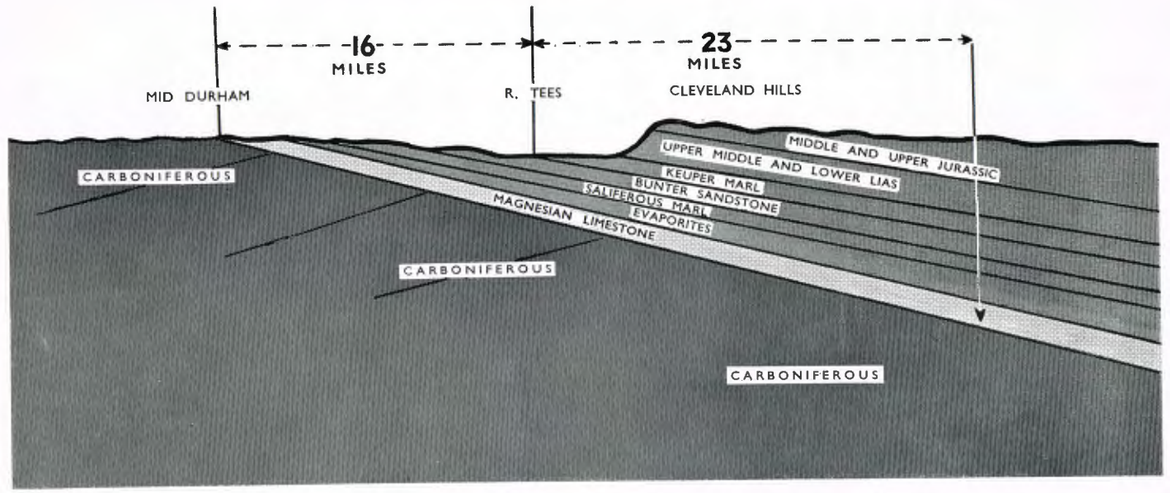
Since the war exploratory drilling has been extended in many countries, with the main purpose of finding oil. Natural gas production has increased accordingly.

For instance, 1951 gas production in the United States had increased to about 7·5 billion cubic feet annually, a rise of over 50% since the end of the war. (This is an English billion—1 followed by twelve noughts—and not the American billion, which is a figure 1 and nine noughts.) Canada is developing a new gas and oil field in Alberta. Here the gas reserves are estimated at 11·5 billion cubic feet. In France rich gas deposits are being worked just north of the Pyrenees. In Italy appreciable deposits have been found in the Po valley. Holland now has a 290-mile pipeline system distributing natural gas as a substitute for town gas from coal.

The main use of natural gas is as fuel. In America natural gas provides over half as much energy as coal, as the following figures show.

SOURCES OF ENERGY IN THE UNITED STATES, 1950

Coal	41·4%
Crude oil	32·6%
Gas (including liquefied petroleum gas and other natural gas liquids) ..	21·5%
Water power	4·5%



A diagram of the geological formation in North Yorkshire, where considerable quantities of natural gas have been discovered in the limestone bed at just over 4800 ft.

The next most important use of natural gas is as a raw material for the chemical industry. In the United States in 1950 more than 40% of all the synthetic ammonia made used natural gas as a raw material. Natural gas is also a potential source of organic products and could form a useful raw material supplement to the petrochemical industry. Minor uses are the production of carbon disulphide from sulphur and methane and the production of carbon black.

One of the great advantages of natural gas as a fuel is its cleanliness and ease of handling compared with solid or liquid fuels. But a price must be paid for this added convenience.

Natural gas is usually found miles from where it is wanted, and a pipeline distribution system must be provided. In the United States there are over a quarter of a million miles of pipe in the vast network which distributes gas from Texas and the south-west to as far afield as New York. Even so, the average price to consumers in 1951 was about 25 cents per 1000 cu. ft. (equivalent to about 2¼d. a therm). Pipelines are a costly investment and initial outlay may be heavy, so the gas field must have a fairly long life.

In 1952 natural gas was discovered at Sui, an almost uninhabited spot in Baluchistan. It will need 350 miles of 16 in. pipeline to take the gas to Karachi where it is wanted. The initial capital cost of the pipeline is estimated at £9 million. The reserve of gas is said to be capable of supplying 100 million cubic feet a day for about sixty years. This would be equivalent in heating value to about 1·6 million tons of coal a year. Since Pakistan at present needs to import nearly 1½ million tons a year of coal, the natural gas supply is a very interesting alternative.

One last question that you may have been turning over in your mind. Where does all this gas come from? And, for that matter, the oil as well? There are various theories on which the experts disagree—volcanic action, radioactivity, decomposition of organic matter. The last named is the generally accepted one and ties up with the usual picture of the formation of coal deposits from the luxuriant vegetation of the carboniferous era. The organic matter was dehydrated and reduced largely to free carbon. But even this led to gas formation. The dreaded firedamp, which adds to the risk of coal mining, is largely methane. As much as 5000 cu. ft. of methane may be set free in cutting a ton of coal; freshly won coal may contain 300–600 cu. ft. of methane per ton.

The essential conditions for gas formation appear to be the deposition of organic matter along with the inorganic matter which forms sedimentary rocks in a marine environment, and subsequent decomposition of the organic matter in the absence of oxygen. This sort of thing goes on, on a small scale, in ponds and still waters.

Methane is produced in the slime at the bottom of the pond. In fact, an old name for methane is marsh gas, and there is a well-known picture by Ford Madox Brown of John Dalton collecting marsh gas, which he needed for experiments to provide supporting evidence for his famous atomic theory. Modern methods of sewage treatment also exemplify this simple step in producing methane. If sewage is treated suitably by digesting it in tanks from which air is excluded, methane is produced; in some sewage works it has been used as a fuel to provide the power needed to pump the sewage and for local lighting.

Of course, most natural gas (and more particularly oil) is much more complicated chemically than the simple hydrocarbon methane. But such materials have been in the earth for millions of years, and slow changes over enormous periods of time under pressure and possibly at high temperatures have effects that man cannot produce in his short span.

THE BATTLE FOR BETTER PENICILLIN

By D. P. Allen (Pharmaceuticals Division)

Ever since penicillin was introduced with such startling results in the last year of the war, research for improvement has been continuous. Many advances have been made, such as the manufacture of a pure form and the discovery of techniques for reducing the frequency of injection. Here is the story of this struggle for a better penicillin.

So much has been written about penicillin that one would think that nothing new remains to be said about it. No drug has been studied so thoroughly as this one, and yet few have offered so strong a challenge to the skill of the scientist and engineer.

Research into improving methods of production, forms of presenting penicillin and ways of giving it has been continuous ever since it was first produced. The two properties of penicillin which have been mainly responsible for so much of this research are the instability of the ordinary soluble salts and the rapid excretion of penicillin from the body.

. . . *familiar units of activity*

An important development occurred early in 1947, when penicillin first became available in a pure form. This was crystalline penicillin G. No fewer than four different penicillins were known to exist, but pure crystalline penicillin G, now often referred to as benzylpenicillin, was found to be one of the most effective. In its manufacture the other penicillins have been eliminated. Today the process of production is so well established that penicillin G is unlikely to be replaced by, for example, penicillin X, which is one of the other pure forms shown by tests to be also very active.

Solutions of crystalline penicillin G, however, are if anything more unstable than the earlier impure product, although, when dry, the pure form can withstand heating for several hours at 100° C. Various substances when added to solutions of penicillin were found to slow down the rate at which they lose their potency. Sodium citrate is probably the most suitable stabilising agent, and today penicillin can be bought with this salt added.

At the same time as these developments were taking place, attempts were being made to present the soluble salts of penicillin in a form which would delay their absorption and excretion in the body and so reduce the frequency of injection. A suspension of penicillin in oil and beeswax was the most successful of the early efforts, but the preparation was rather painful to inject and it also possessed other undesirable properties.

Attention was therefore directed to prolonging the action of penicillin by converting it to less soluble salts. Many salts were tried. The most successful—now in widespread use—is the procaine salt of penicillin G. This salt is only slightly soluble in water and is only slowly absorbed by the body.

Oily suspensions of procaine penicillin were first tried and are still widely used, especially in tropical countries, on account of their stability. Aqueous suspensions of this salt of penicillin, however, stabilised with sodium citrate, have become available during the past two or three years and have proved very popular, as they are much more convenient for both doctor and patient. All these preparations enable adequate treatment to be given by single daily injections.

Recently (in 1951) a new salt was discovered and acclaimed by some as the most outstanding advance yet made in the development of penicillin. Known chemically as *N:N'-dibenzylethylenediamine dipenicillin G*, it is almost completely insoluble, being 24 times less soluble than the procaine salt. When injected, its absorption and excretion are so slow that penicillin can be found in the blood some fourteen days after it has been administered.

The problem of lengthening the time that penicillin remains in the blood-stream has been investigated from yet another angle. Certain substances were known to lower the rate of excretion of penicillin by the kidneys and so enable the penicillin to remain longer in the blood. This method has never been widely adopted, however, but one compound called probenecid seems to hold some promise and has found acceptance in the United States of America.

. . . 14 *days after being taken*

A further interesting development concerns the discovery of certain forms of penicillin preparations which are selectively absorbed and excreted by particular organs of the body. There is one form which has an affinity for lung tissues and is reported to give concentrations of penicillin in the sputum about four times as high as those obtainable with the same dose of an ordinary soluble salt of penicillin G.

The continuous improvements in manufacture of penicillin have led to a tremendous increase in output. In 1947 the total produced in Britain was 4881 million mega units and in 1952 it had reached 67,394 million mega units (a mega unit = 1 million units). As production increased, so the price fell. In 1947 5 mega units cost £5 5s. Today the same amount can be bought for 12s. 6d.

Now that supply is plentiful, doctors have been directing their attention more to giving penicillin by the mouth instead of by injection as formerly. Provided one gives at least five times the dose by mouth as compared with what is usually required by injection, satisfactory blood-levels can be obtained in about 80% of the cases. This method of administering penicillin is much more convenient and is particularly suitable for children.

Today penicillin tablets have been widely adopted for treating certain milder types of infection. The drug, however, has still to be given by injection for severe infections where it is essential to get a lot of penicillin quickly into the blood-stream.

One of the latest preparations to be designed for giving penicillin by the mouth is 'Dibencil' Oral Suspension, which contains the almost insoluble salt of penicillin referred to previously, *N:N -dibenzylethylenediamine dipenicillin G*. This salt is particularly suitable for oral administration because it is completely free from the taste of penicillin, and the suspension is issued ready for use, requires no preliminary preparation, and will keep for at least eighteen months at normal room temperatures.

With the fall in price, greater use is now being made of penicillin in the treatment of animal diseases. The veterinary surgeon uses not only the same preparations of penicillin as the doctor but also many other specially developed forms. 'Avdet' penicillin teat bougies are an example. They are torpedo-shaped tablets about the same size as a matchstick and are inserted into the cow's udder via the teat for treatment of mastitis.

Yet another outstanding development took place last year when the Penicillin Act was amended on the advice of the Ministry of Agriculture and animal rations containing certain specified amounts of the antibiotic were permitted to be sold direct to farmers for fattening and improving the rate of growth of young pigs and poultry. 'Promix'-2 Penicillin Supplement, which is now being marketed by Pharmaceuticals Division, contains procaine penicillin and is specially prepared to enable the farmer to fortify his own livestock rations as required.

Thus the development of penicillin seems to be an endless process. When first introduced, penicillin revolutionised the practice of medicine in the treatment of disease. Its place in medicine is now so firmly established that it may well be said of penicillin, as has been said of Shakespeare's works: "Not of an age, but for all time!"

THE SAD STORY OF KATE

Contributed by Miss N. Lewis (Head Office)

Fill in all blanks with words ending in . . . kate or . . . cate.

KATE was an elderly, (1)d little spinster who, in spite of being well (2)d, had one great fault which she found very difficult to (3): she was often (4)d, a fact which she tried to conceal by (5)ing (6)d lozenges; but her work, alas, became very unreliable. She was confidential clerk to a (7) and did (8) bookkeeping which involved (9)ing several sets of figures.

Unfortunately, one day when the auditors wanted to (10) a (11), a discrepancy in the amounts seemed to (12) a deficit. She tried to (13) and (14) over very thin ice, but this only served to (15) the issue and (16) her further. The books were (17)d and she found it difficult to (18) herself from a (19) situation. She engaged a good (20) who (21)d her innocence and tried to (22) her employers, but in vain. She had to (23) her post and now, in spite of being very un(24)d, she (25)s in a country cottage and (26)s her life to (27)ing her damaged reputation.

(1) Dried-up Kate. (2) Kate schooled. (3) Kate roots out. (4) Kate drunk. (5) Kate chewing. (6) Medicinal Kate. (7) Kate in association. (8) Kate involved. (9) Twice Kate. (10) Kate makes valid. (11) Kate's document. (12) Point out Kate. (13) Kate quibbling. (14) Kate sliding. (15) Kate mixed up. (16) Kate entangled. (17) Kate appropriated. (18) Kate disentangled. (19) Ticklish Kate. (20) Kate the lawyer. (21) Kate asserts. (22) Conciliatory Kate. (23) Kate leaves. (24) Kate fond of home. (25) Kate lives in the country. (26) Devoted Kate. (27) Kate maintains the cause.

NEW WAYS OF KILLING STATIC ELECTRICITY

By G. G. Fowlie (Nobel Division)

Static electricity has long been a potential hazard in industry, particularly in the manufacture of explosives. Now a new technique for attacking this problem has been found, using radioactive material. Here is an account of this development.

THE phenomena of static electricity have been known for over 2000 years. Indeed, as early as 600 B.C. the Greeks observed that pieces of amber, jet, and perhaps a few other substances after brisk rubbing had power to attract light objects such as bits of straw and paper. Often when a child's hair has been vigorously combed the hair will stand on end to follow the comb as it is withdrawn. Such a charged comb will also attract small pieces of paper. These static charges may be produced in a very large number of industrial operations where insulating materials are present.

Static can affect production in three ways:

(*a*) It can slow up the rate of production and reduce the value of the product. In the textile industry, for example, a bundle of charged yarns bows out sideways and is difficult to wind up. Attraction between conductors and charged textiles causes them to stick to parts of the machinery. A charged textile attracts dirt.

. . . *charges will be lost more quickly*

(*b*) Static charges may give electric shocks to plant workers and cause other types of accident if materials which are sensitive to blows are being handled.

(*c*) Static may cause ignitions of sensitive materials, such as inflammable vapours, dusts or powders, and lead to extensive fire or maybe explosion if an electric spark of sufficiently high energy passes through or very near the sensitive material. This is of the greatest importance in the explosives industry.

The most dangerous sparks may come from conductors on which charges may be induced when they are near charged bodies. The worker looking after the process is almost invariably the most hazardous moving conductor in industrial operations.

What can be done about the hazards of static? Movement of conductors may be prevented or a less sensitive material substituted in the process. This cannot always be done, and earthing all conductors may reduce the hazard to an acceptable level. Plant workers are earthed by electrically conducting flooring and footwear, and fixed conductors are earthed directly.

Another way is to fill buildings with a moist atmosphere so that all surfaces within are covered with a thin film of moisture. Air is saturated with steam or by water spray humidifiers. This method, however, may cause bad working conditions or reduce the efficiency of the process.

Radioactive static eliminators give a new and sometimes a better way. Ordinary air is a very poor conductor of electricity: all the electricity which passes through it is carried by ions (i.e. charged atoms), of which a very small number are always present. Normally, therefore, a static charge leaks away very slowly.

If, however, radioactive material is introduced, the alpha, beta or gamma rays shot off will increase the number of ions in the air and static charges will be more quickly lost.

The most intense effect is from alpha rays, which have a range of less than four inches in air, while the beta rays range up to 30 ft. For many applications beta rays are preferable because they have a longer range and are safer to work with. They are also available in ever-increasing quantities as by-products of the Harwell atomic piles.

Thallium 204 and strontium 90 are radioactive isotopes used as static eliminators in Britain. At Ardeer strontium 90 is being used to solve an interesting static problem.

Lead styphnate, an explosive that is very sensitive to spark ignition, is made at Ardeer for loading into detonators, and before use it must be specially dried for 24 hours. For safe handling the drying sheds are equipped with floor coverings of jute carpet and cotton overcarpet, which happen to be electrically non-conducting. It is therefore possible in very rare circumstances for sufficient static to build up on a man due to his own exertions and cause a spark. It was found that if the resistance to earth of a man in a styphnate drying shed is no more than 50,000 megohms the hazard would be reduced to negligible proportions.

. . . *safer to work with*

The strontium 90 static eliminator is in the form of a metal foil bound in metallic silver. Within the silver the radioactive material is so firmly bonded that it cannot be released accidentally, and all external surfaces are free from radioactive contamination.

Such space ionisation is valuable but can only be applied in special circumstances where the static generation is small. It is not costly and is always on duty. Since the radioactive material is effective for sixteen years, the cost of equipping a styphnate shed with enough strontium 90 is about £1 per annum.

Philately Philanderings

By F. G. Stevens

Rich and poor, young and old, alike succumb to and enjoy stamp collecting. Here is a brief introduction to the world-wide hobby of philately by one who developed his interest from small beginnings and a modest expenditure and who today owns over 50,000 stamps, value unknown.

IT is not known exactly when the first stamp collector originated—probably on the day the first stamp was issued—but it is known that by 1850 there were very many persons interested in collecting and classifying those novel bits of paper, as stamps were then regarded. It all started very simply from the collecting instinct, and at that time stamp collecting was just a hobby and nothing more. Ten years later—about 1860—the first recorded literature on stamps and stamp collecting appeared. From that date advanced collectors no longer regarded stamp collecting as a hobby, but more of a science, with investment possibilities.

So much for the origin of philately, which, in brief, implies the collection and study of postage stamps.

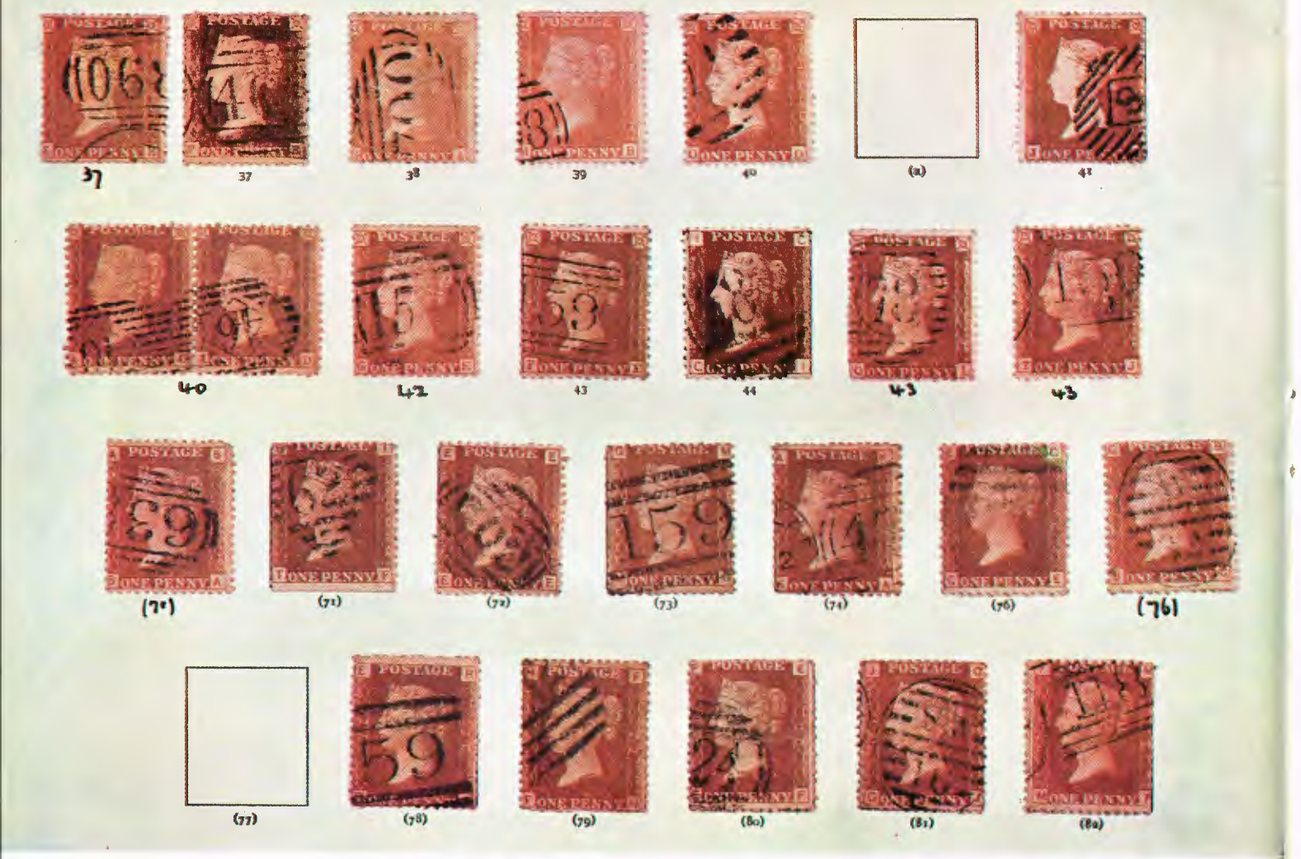
Who collects stamps? It would be a much simpler task to tell you who does not collect them, for philately draws its devotees from every age and every walk of life. Most of us first become interested in stamps while still at school. Many retain their interest for a time and then forget it in the distraction of new pursuits, for youthful interests are subject to many changes. Others drop it for a time and then in later years come back to it with renewed interest. There are others who never feel the urge until they have reached maturity, and in the case of these people their interest when finally awakened is usually permanent, for they have the capacity to realise to the full extent the real value of philately.

Personally I collected as a schoolboy and then dropped it until 1934, when I took it up again most seriously, but purely as a hobby, with no thought of gain. The war came, and I found in philately much comfort and the greatest possible form of relaxation. Often after working to midnight or beyond I would have an hour or so with my stamps and then go to bed early in the morning, physically and mentally restored and able to sleep the sleep of the just. Without this hobby I do not think it would have been possible for me to work the long hours I did frequently right through the week-ends during the war.

A few years ago it suddenly dawned on me that what I had regarded as an ideal way of spending my spare moments had at the same time increased my worldly wealth quite a lot. The prices of certain stamps, especially British Colonials, have soared tremendously in recent years, and as I then had a collection of about 30,000 stamps it was not surprising that I was lucky enough to benefit in the general rise in the value of all stamps. Stamps seldom depreciate. Today I have over 50,000 stamps housed in twenty albums—value unknown.

The greatest collection the world has ever known belonged to Count Ferrari, who died about twenty years ago. When sold at an auction by the French Government his vast accumulation of stamps realised nearly half a million pounds.

Yes, stamp collectors are in good company. Many monarchs are ardent and active collectors. The late George VI left a most valuable collection. As it exists today, I



VICTORIAN PENNY REDS. *The stamps here are worth only a few pence to a few shillings each, but plate No. 77, which is missing, is catalogued at £300. It is thought that only six of these were printed, due to faulty engraving.*

expect it is worth about £750,000. Great leaders in finance and business, outstanding statesmen, professional men, scientists, and pioneers in industry are represented many times over in the ranks of philately. But these people represent only a minute fraction of the great multitude of others. It is certainly a most democratic hobby, for it is open to all, from the millionaire down to the boy or girl with but a few pennies to spend.

Most of you have asked yourselves why stamp collecting has such a universal appeal and why it has made such a tremendous growth. The reasons are almost as numerous as the host of collectors. As children we collect either because we have the collecting instinct or because we are fascinated by the beauty and attractiveness of these bits of paper. We sort and arrange them by countries. We then see the history, the drama they depict.

No course in geography ever devised can teach as much as a study of the world's story in such graphic form as shown on its stamps. No art gallery in all the world holds a fraction of the great masterpieces portrayed on stamps.

Would you know the rulers of a nation but for them? Look at their faces exquisitely engraved on that nation's stamps. Would you learn otherwise of that country's great battles, its buildings, its manner of life, its people, its resources, its trees and flowers and animals? Every step in national growth, every type of human instinct and experience has been recorded in pictorial form on the postage stamps of the world.

(81)

A PENNY RED ENLARGED, *showing the plate number* (81) *printed in the side margins. Modern stamps do not have plate numbers, which are a peculiar feature of Victorian penny reds and twopenny blues.*

SOME FINER POINTS OF PHILATELY

A GEORGE V PRINTING ERROR. *The left-hand stamp is worth twopence, but the right-hand one is catalogued at £4 because of the mistake "halfpencf" instead of "halfpence." Several hundred stamps were printed with this error.*

A MISSING DOT MEANS MONEY. *The left-hand stamp with two dots under the "D" is correctly printed and therefore worth only a few shillings. The right-hand stamp with the missing dot is catalogued at £12. This error is a good illustration of the minute care with which stamps are examined by philatelists.*

TWO TWOPENNY BLUES, *identical to the casual eye but with a price difference of over £8. The stamp on the left has a white line top and bottom, which identifies it as a later issue than the one on the right. The left-hand stamp is catalogued at 30s. and the right-hand one at £10.*

To me—and indeed to many people today—philately is no longer a hobby but a source of profitable study—an investment; and it is that aspect of collecting that I now wish to deal with.

There are three principal ways of securing your stamps: by gifts, exchange or purchase. Gifts of stamps are few and far between and will not get you very far with your collection. As to exchanging stamps, it is obvious that you must first have some of your own. When you have duplicates of certain stamps, you look round for a collector friend with duplicates of others. You then get together and exchange with each other to your mutual satisfaction.

If you join a stamp club you have greater opportunities of exchanging. If you wish to indulge in the exchange business more extensively it can be done through the post. Almost every stamp publication carries advertisements of persons in all parts of the world who want to exchange stamps. There are also special exchange clubs, some of long standing, which make a business of bringing together, through the medium of correspondence, exchanges in all parts of the world.

My own principal source of supply for stamps is by purchase. You can buy practically anything you want in the way of stamps if you know where to go for them. There are many sources, of which I will mention the more important, those which every collector should know.

Let me tell you, if I may, what I think is the best way of starting a collection. I am going to assume that you start with nothing at all.

How to Start Collecting

The first thing I would do is to buy a variety packet of 2000 stamps of the whole world. I saw several lots sold recently at an auction sale at about £1 per packet, which works out at about an eighth of a penny per stamp. If you bought the stamps individually from approval sheets they would cost you much more. This latter is the schoolboy's method and one I do not favour at all, since it is by far the most expensive way of collecting and much the least exciting.

Now, having obtained a nucleus of 2000 stamps for my collection, I would begin to haunt the auction rooms. There are many in the City and West End. Auction firms issue a printed catalogue for each sale in which are listed and accurately described several hundred lots consisting of anything from a single stamp to a collection of many thousands. One looks through the list and marks off the lots in which one is likely to be interested. If at all possible, one then makes a point of viewing them and assessing their value. This is undoubtedly the best way of adding to one's collection.

Unless you are really an advanced collector, the lots to go for are those of several thousand mixed stamps or a moderately sized collection of from 4000 to 5000. If the latter, take out the stamps you need for your collection, add any duplicates that you may have, and then arrange for the collection as finally constituted to be put up for sale at a later auction in due course. If you go on doing this, buying a slightly better collection each time, you will be able to build up a collection rapidly and cheaply. It is as well to buy an occasional odd lot of mixed stamps from time to time and use the duplicates as gap fillers in the various collections you buy and re-sell as opportunity arises. The commission for selling stamps at an auction ranges from 10% to 17½%.

By the way, if you have fairly valuable stamps for sale it is much better to mount them nicely on clean sheets or in an approval book. Often I have bought a loose lot of good stamps, taken out a number of stamps for my collection, neatly mounted the best of the balance on sheets and obtained a price higher than I paid for the original lot. Presentation certainly pays!

Pitfalls of a Mixture

Never buy by weight—the mission mixture, post office mixture, and so on, that you see advertised from time to time—if you are a beginner. Stamps purchased by the pound in this way consist mainly of nothing but the commonest varieties, some 4000 or 5000 to the pound and mostly on bits of their original envelopes.

The real value of a mixture is in the variety of special shades, cancellations, odd perforations and such minor varieties. The specialist in certain lines gets more than his money's worth, but for the beginner such buying is not worth while. He simply does not know what to look for and hence loses the principal value of the mixture. To a beginner it is a laborious job looking through so many for so few, and there is nothing more likely to "brown off" a novice than wading through thousands of stamps with little result.

That reminds me, never sell stamps to a dealer. It is true that this will bring cash on delivery, but a low price. Remember that your dealer has to put those stamps in his stock and may carry them for a long time before he can sell them, his money being tied up all the time. Naturally, he has therefore to buy at low prices; so your returns, while quick, will be small.

In the auction rooms, which incidentally are packed to capacity in these days, there are usually several people interested in each lot, which leads to keen competition and better prices, especially for the more valuable lots. You can also get high returns through the sales department of a stamp club.

MY KENTISH WINE

By

George Ordish (Central Agricultural Control)

ST. Paul's advice to Timothy was to "Drink no longer water, but use a little wine for thy stomach's sake and thine often infirmities" (First Epistle of St. Paul to Timothy, v. 23). This excellent precept is perhaps difficult to carry out today because, though one of the minor pleasures of life is drinking wine, one of the major deterrents to indulging in this pleasant habit is its expense. This is where the amateur comes into his own, because wine is not at all difficult to make if one sets about it in the right way.

Today, professional services, unless they are paid for by insurance or by the State (which is much the same thing), become more and more expensive. To have a room decorated, to own a boat or to have a fine collection of flowers in the garden are things one must consider seriously before buying them. To overcome these difficulties, and to indulge in these and a multitude of similar activities, we become the amateur decorator, sailor and gardener.

Wine is considered a luxury in most of England, but it is a necessity in most of Europe, and in fact it was rationed there during the war in much the same way as was food in Britain. To some extent wine is a luxury in Britain because of the heavy tax, and here the amateur has an advantage, as with our new varieties of grapes, or by using other fruits, flowers or vegetables, it is possible to produce good-quality, fine, healthy, pleasant wines which the amateur can drink and give away as much as he likes without paying any of the excise tax of 1s. 9d. per bottle. Apart from the cash advantage, it is pleasant to drink one's own wine, and the amateur will get a great deal of enjoyment out of handling his own vintage.

The vine was brought to Italy by the Greeks from its original home in Asia Minor, and from Italy it spread to France and Britain. Protection was as much a tenet of ancient times as today, and the Roman emperor Domitian prohibited the planting of the vine outside Italy (A.D. 90) in the interests of the home producers; but one of his successors, Probus, perhaps more of a free-trader or bowing to the inevitable, repealed this edict (A.D. 280) and allowed the vine to be planted in all parts of the empire.

GATHERING THE GRAPES *at the author's home at Yalding in Kent. These are Brant grapes planted in* 1937. *They have been in full bearing since* 1940. *The Brant is a Canadian-European hybrid.*

CRUSHING THE GRAPES. *The crusher is made from an old clothes mangle, and the must or crushed grape falls into the tub below. It is later fermented in a barrel.*

A big industry was founded in France and Spain, but the vine was also planted in Britain and many other parts of the Roman world.

In Roman, Saxon, Norman and Plantagenet times vineyards were fairly numerous in this country and they still exist to this day, though to a smaller extent. The early English vines were probably not as good as those we can grow today; and with the new varieties of grapes available there is no reason why this good, stimulating and healthy beverage should not be more widely produced in Britain. For example, as late as 1914 there was a large vineyard producing good wine on a commercial scale in Glamorgan. I find my own vintage pleasant; even the B.B.C. has commented favourably on my bottles.

I used to work in France, where I found that nearly every farmer made his own wine as a matter of course, and with no great difficulty. When I went to work for Plant Protection Ltd. at Yalding, Kent, I noticed that the climate was not very different from that of the Champagne, and in reading history found that in Domesday Book several vineyards were mentioned along the Medway valley. I immediately planted some vines on my house and in my garden, and they thrived so well that today I make fifty or sixty gallons of wine a year—which is nearly a bottle a day!

I use three varieties of grapes—*Brant* and *Gamay Hatif des Vosges* (both blacks) and *Madeleine Royal* (a white), though most of my wine is made from the first mentioned.

The grapes grow on the south, east and west sides of my house and reach to the gutters, and they cover any spare space in the garden. In winter they are spur-pruned and tied into the supporting wirework. In summer they grow furiously and may need spraying with 'Perenox' (an I.C.I. product) and dusting with sulphur to control mildews. At the end of September the picking starts; it should be done on a warm, dry day and the grapes crushed at once.

As soon as one mentions home-made wine everyone at once imagines it being trodden out with the feet. We do not do this (though it is a good method) but put them through a pair of wooden rollers made from an old mangle. This crushes the grapes into must, which is then left in a tub to ferment. It is stirred, and after a week or ten days the stalks and skins are separated from the wine in the winepress and the small barrels (or pins) are filled with the young wine. They are kept full all the time by regular topping up from a spare jar.

A winepress is not essential, as most of the wine runs away from the pulp of its own accord. A jelly bag or a pillow slip will do the job quite well, though all the snows of Araby will never whiten the slip again. What is more essential for success is a hydrometer, but with practice a fresh egg makes a good substitute, though this last may well be a rare object today.

The wine to be successful, to keep and to mature well needs about 10 % of alcohol (by volume), and this will come from the presence of $1\frac{3}{4}$ lb. of sugar per gallon of must. One can test for this sugar by floating a hydrometer in a sample of the fresh juice, when it should register a specific gravity of 1·075 or more. A fresh egg, pointed end downwards, should float to leave about the area of half a crown exposed, but the egg must be fresh; as it gets staler the air space increases, so it floats higher and gives an optimistic reading of the value of the juice. If the gravity is below 1·075 (or the egg sinks too low) it should be raised to this level by adding sugar. The exact amount of sugar needed per gallon of juice for each gravity reading can be found by consulting a suitable sugar table, which is readily available.

(*Above*) BARRELS OF HOME-MADE WINE *in the author's cellar. Chalked on the barrel is the year of the vintage.* (*Below*) THE WINEPRESS IN ACTION. *This is the next stage after fermentation. The press is home-made, and as the must is pressed, wine pours through the slats into a jug.*

BOTTLING THE WINE. *The author is using an old-fashioned French corker costing 5s. Alongside can be seen the hydrometer, an essential instrument for testing the sugar content of the must.*

One of the secrets of successful winemaking is to keep all vessels full all the time in order to exclude contact with the air. This means constant topping up of barrels and jars from smaller jars and bottles. In the absence of air the wine will not be able to undergo undesirable secondary fermentation and turn to vinegar. Another important point is to have everything very clean and exposed to the fumes of burning sulphur before use. When fermentation has stopped, the wine is left in an outhouse for the winter, as the cold weather clears it beautifully. In January it is drawn off from the lees and bottled in the following December.

It is best to wait two years from the date of picking before drinking it, or at least fifteen months. This may seem to be a long wait, but after the first two years, and if one makes wine every year, there is always a vintage coming forward.

Other fruits and flowers make palatable wines, though I prefer the grape. Most of us will have heard of cowslip, dandelion, elderflower, elderberry, parsnip and plum wines, and many others. The two I prefer are elderflower and plum wine. In my opinion the secret of a good country wine is not to have it too strong and to let it mature sufficiently. Here again I think 10% of alcohol is the right level, and this comes from starting with $1\frac{3}{4}$ lb. of sugar per gallon of must.

With flower wines all the sugar (and, of course, the water) must be added, but with those made from fruits some of both is obtained from the fruit and some must be added. The approximate amounts of fruit, sugar and water can be ascertained from a good recipe; and the exact amount of additional sugar or water from the use of the hydrometer (and table) or the fresh egg, because the sugar in the fruit will vary from year to year.

When the formula has been decided upon (for instance 8 lb. ripe plums, 5 oz. sugar, 1 pint water) the mixture is crushed and set in the warm to ferment, and after a few days the wine is separated from the pulp. When fermentation is finished it is topped up, then bunged down, left all the winter in the cold to clear, then bottled and left to mature.

Home wine-making is an attractive (and legal) source of tax-free alcohol. But I have a final caution—do not start distilling, for two reasons: firstly because it is very difficult to get a drinkable liquor, and secondly it is very illegal. Like Nanki Poo, I am not quite sure what the punishment is, but it is, as he or the Mikado said, "something with boiling oil in it."

I.C.I. NEWS

HEAD OFFICE

Cross-country Champion

An honoured guest at a banquet in Birmingham recently was Mr. W. M. Cotterell, a commissionaire at Bolton House. The banquet was given by the English Cross-Country Union to celebrate the sixtieth international cross-country championship, and Mr. Cotterell was there in his capacity as a celebrated international cross-country runner.

Mr. W. M. Cotterell

It was exactly thirty years ago that he first won the international cross-country championship for Britain. He was then in the Royal Corps of Signals, and although he was only 22 he had an imposing list of county, club, national and Army championships to his credit.

Mr. Cotterell won the international cross-country championship again in 1929. By that time his running successes would have filled a small book. Among them were the Army 3 miles and 1 mile, the English 4 miles, the A.A.A. 4 miles, the Southern Counties 4 miles, the Sussex 3 miles, the Royal Signals 880 yards, 1 mile and 3 miles—and innumerable others. In the cross-country field he had been champion of the army (6 times), South of Thames (4 times), Sussex (5 times), Eastern Command (5 times) and Royal Signals (8 times).

By the time he retired from the army after the second world war he was something of a legend. He was the only serviceman ever to have won the national and international cross-country championships, and the only man to have won the Army 3 mile championship eight years in succession. He had represented the army in athletics for a record number of years—1921–33. Small wonder that the army now gives a Cotterell Cup to the best athletic all-rounder of the year.

When Mr. Cotterell left the army he became P.T. master at a London school. After a year he had to leave, crippled—ironically enough—by a very painful condition of the Achilles tendons, which has since cleared up.

Now on the wrong side of 50 and a member of the A.A.A., he officiates at the Surrey Athletic Club at week-ends. He is remarkably fit for his age, and can (but seldom does) walk the length of Bolton House foyer on his hands.

ALKALI DIVISION

Polythene for New Transatlantic Cable

The new £$12\frac{1}{2}$ million transatlantic telephone cable which is to be laid between Oban and Nova Scotia within the next three years has been made possible by the unique properties of polythene. It is believed that 90% of the cable will be made in Britain and insulated with polythene mixed with 5% of butyl rubber.

The cable will in time supplant the present radiotelephone circuits between Great Britain and North America and will provide for thirty-six simultaneous conversations. It will be ten times longer than any other used to date for submarine telephony and the first to be laid in depths exceeding 1000 fathoms.

Polythene-insulated submarine telephone cables have already been well tried. During the war 1000 miles were laid round the British coast, and since then 12,000 miles have been manufactured by Submarine Cables Ltd. at Greenwich.

BILLINGHAM DIVISION

New Personnel Director

Dr. A. M. McKay, deputy chief engineer at Billingham, has succeeded Mr. C. M. Wright as Division personnel director. Mr. Wright was recently appointed chairman of Wilton Council.

Dr. A. M. McKay

Dr. McKay went to Billingham in January 1934 as assistant manager in Engineering Workshops, and after a period in Research Works he returned to Workshops and became machine shop manager.

He served throughout the war in the Royal Engineers, mainly in the Middle East, East Africa and India, attained the rank of Lieutenant-Colonel and was mentioned in dispatches.

On his return to Billingham in 1945 he was appointed deputy works engineer in Oil Works. In 1947 he became works engineer in Research Works and after a short period in Technical Sales Service was appointed deputy chief engineer in July 1950.

Among his outside interests is rugby football, and he is a member of the committee of Synthonia Rugby Section.

CENTRAL AGRICULTURAL CONTROL

Asian Students at Fernhurst

On 5th April eleven foreign students sent to Britain under the Colombo Plan were welcomed at Fernhurst, the Plant Protection research centre, by Mr. S. P. Stotter, resident director and controller.

The eleven students—five are from India, three from Pakistan, two from the Philippines and one from Indonesia—

Mr. F. W. J. Lane explains plant protection machinery to Colombo Plan students at Fernhurst

will spend some five months at Fernhurst. During this time they will study botany, entomology, mycology and field trials under the appropriate Fernhurst sections, and learn about sprayers, dusters and tractors. Part of their time will be spent working alongside the Fernhurst staff on actual current problems.

On their first day at Fernhurst the students were interviewed by a B.B.C. recording unit and they recorded messages to their own homes to be broadcast later on the B.B.C. Far Eastern programme.

Handy Packs for P.P. Products

A great many gardeners are going to save themselves trouble—and money—this season by using the new Jiffy Packs introduced by Plant Protection Ltd. These plastic packs contain just the right amount of insecticide or weedkiller to make two gallons of mixture. The gardener just snips off the corner with a pair of scissors and pours the contents into a two-gallon bucket of water. The two products available in this handy form are 'Sybol' (the BHC garden insecticide) and 'Verdone' selective weedkiller for lawns.

The 'Sybol' pack is a card on which three plastic capsules are mounted, and the 'Verdone' card carries two plastic sachets of 'Verdone.' These cards cost 1s. 6d. each.

These new economical and trouble-saving packs are designed to appeal mainly to the small gardener who wants a simple method of application without the bother of measuring, and who wants to avoid the waste that can result from left-overs in standard containers. The Jiffy Packs will be of particular interest to women gardeners, who will find them easier to use, easier to store, and easier to carry home.

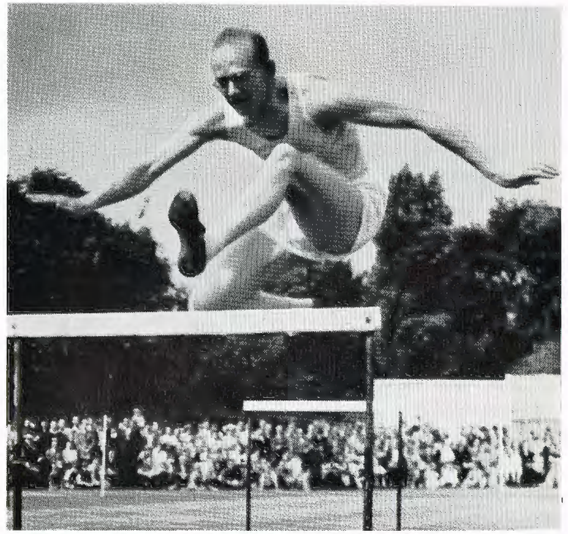
Plant Protection also had the interests of the woman gardener in mind when redesigning two other packs—for 'Atlacide' Weedkiller Dust and 'Drymac' Derris Dust. Both are now slimmer and a great deal easier to handle, and the 'Drymac' pack incorporates a small bellows device which makes application of the powder very simple.

The new 'Atlacide' pack has been designed to help the woman gardener

DYESTUFFS DIVISION

Champion rests on his Laurels

Harry Whittle, captain of the British Athletics team at the last Olympic Games, has decided to retire from competitive athletics. Announcing this at the end of March, Mr. Whittle said he would continue to enter for club events. He finds that his job (he recently returned to the Division engineering department from a year's post-graduate course at Cambridge) and family life allow him insufficient time for the intensive training needed for international events.



Britain's record hurdler, Harry Whittle, who is retiring from competitive athletics

Mr. Whittle, who is 32, is a versatile athlete. But although he was British A.A.A. decathlon champion once and long-jump champion three times, it is as a hurdler that he has chiefly made his name. He first won the A.A.A. 440 yards hurdles title at the age of 25 and subsequently won it another six years in succession. He also holds the British national record of 52·7 seconds for the 440 yards hurdles (Lord Burghley's best was 53·8 seconds). At the Helsinki Olympic Games he was fifth, with a time equal to his best, in the 400 metres hurdles.

During his time at Cambridge Harry Whittle jumped and hurdled for the university, and was a member of the combined Oxford and Cambridge team that toured the U.S.A. in 1953. He made yearly visits overseas as an athlete from 1947 onwards, and in 1950 went to New Zealand for the Empire Games; in the same year he was British captain at the European Games, and in 1951 was captain of the British team in the Balkan Games.

It is to be hoped that Mr. Whittle's decision to retire from competitive athletics will not deprive the up-and-coming generation of his advice and encouragement. He holds strong views about training for international events, and believes that with more training facilities and more coaches Britain would forge ahead in big events abroad. After the 1952 Olympics he said "There is nothing radically wrong with the English method of training. What we do need, and have needed for a long time, are better facilities—more tracks provided by local authorities." He is equally emphatic, however, on the merits of British "amateurism," and would not want to see our system changed for one in which athletes —as in some other countries—are subsidised by the state.

GENERAL CHEMICALS DIVISION

Seaweed Flies meet their Fate

The Battle of the South Coast Flies took a new turn last month when I.C.I. obtained an initial order for 'Gammexane' Emulsion Concentrate for spraying 90 acres of beaches at Newhaven and at Southwick, near Brighton. Since last summer the beaches of these resorts have been plagued with swarms of seaweed flies which threatened to drive visitors away.

The 'Gammexane'-spraying amphibian sets off from Brighton to spray the beach at Newhaven

Division technical service men and representatives of Southern Region sales office were on the scene on 8th April to see the job off to a good start. The 'Gammexane' is mixed with sea water and sprayed on the beaches by a DUKW amphibian which crawls along by the water's edge. The 'Gammexane' leaves no odour and is harmless to humans in the concentration used, and this summer holidaymakers should be able to enjoy the beaches in comfort.

Painter becomes Squadron C.O.

Mr. W. M. Caldwell, a painter at Rocksavage Works, has been promoted to Officer Commanding the Runcorn squadron of the Air Training Corps, with the rank of Flight Lieutenant.

Mr. W. M. Caldwell

Mr. Caldwell first joined the squadron in 1941. Soon afterwards he volunteered for the Royal Marines, and served with light A.A. units and flak ships in England and Holland. When he was demobilised he rejoined the Boys Brigade, of which he had been a member before joining the A.T.C. This time, however, instead of being instructed he was himself instructing the boys, in P.T., boxing and drill.

When the Boys Brigade company disbanded he joined the Runcorn A.T.C. squadron as a civilian P.T. and drill instructor and was commissioned in 1948.

Latter-day Faraday

A spare-time occupation, in which he has employed his knowledge of work study, has brought the gratitude of many chemists to Dr. J. E. Faraday, Division Work Study Officer.

Dr. J. E. Faraday

The fruits of Dr. Faraday's evening and week-end work since 1942 are thirteen bulky volumes entitled *Faraday's Encyclopaedia of Hydrocarbon Compounds*. They list all the hydrocarbons containing up to fourteen carbon atoms, their occurrence in nature, methods of preparation and principal physical properties. Volume I, which appeared in 1945, deals with compounds containing from one to five carbon atoms in the molecule, volume II deals with those containing six to seven carbon atoms, and so on. A feature of the encyclopaedia, rare in reference works of this type, is that it is loose leaf and the volumes are constantly brought up to date by the issue of supplements. Dr. Faraday plans to issue new volumes until the subject (or he himself) is exhausted.

Compiling the encyclopaedia involves sifting all the information published to date about each compound. Dr. Faraday uses as sources the principal British, American and German abstract journals, but even so he has had to call in other chemists to help with the surveying of the literature.

Before the war organic chemists relied greatly for their technical reference material on a German encyclopaedia of

the same kind as Dr. Faraday's, which was, however, about twenty years out of date and which ceased publication after the war (but has since been revived). Dr. Faraday has thus brought to Britain a research and publishing activity which before the war was a German preserve.

Dr. Faraday has been with I.C.I. since 1946. He was at Wilton for five years before becoming Work Study Officer at Pilkington-Sullivan Works and in March of this year was appointed Division Work Study Officer. His name is no coincidence, for he is a collateral descendant of the great scientist.

Examination Successes

Two members of the Division have distinguished themselves in examinations of the Association of Certified and Corporate Accountants.

Mr. T. Trimble of Castner-Kellner Works has been placed third in Part II of the final, from candidates all over Britain. He has already been placed third in the intermediate examination and second in Part I of the final.

Mr. R. M. Reynolds of the Chief Accountant's Department in Liverpool took fourth place in the same examination.

LEATHERCLOTH DIVISION

Further Success for Standardbearer

Mr. William Turner, who is a spreader at Hyde Factory, has achieved a great honour for the town and for himself in winning, at the first attempt, the north-west area title in the British Legion standardbearers' competition.

Mr. W. Turner

Mr. Turner won the county standardbearers' title in June last year, and this entitled him to represent Cheshire in the north-western area competition at Penrith on 13th February. He thus holds the Hyde standard, the Cheshire county standard and the north-west area standard, which covers all the north-west counties, and will compete this month in the national final at Wellington Barracks, London, where he is strongly fancied to become the all-England champion.

Mr. Turner served with the 6th Battalion, the Cheshire Regiment, during the war, and his wife is the standardbearer for the women's section of the Hyde British Legion.

METALS DIVISION

Unique Occasion

It is not every factory which can claim to have been used, even briefly, as an alternative to Buckingham Palace.

On 16th March Waunarlwydd Works joined the select ranks of such establishments, when the Lord Lieutenant of Glamorgan, Major C. G. Traherne, T.D., J.P., visited the factory as a personal representative of H.M. the Queen to

Mr. Painter shakes hands with the Lord Lieutenant of Glamorgan after receiving his B.E.M.

invest Mr. T. W. Painter with the British Empire Medal awarded him in the New Year Honours List.

The citation referred to the important contribution made by Mr. Painter to the efficiency and productivity of Waunarlwydd Works and to his skill in training local unskilled labour. Before carrying out the investiture the Lord Lieutenant described Mr. Painter as an example of what a good servant of industry should be and read aloud a letter of congratulation signed in the Queen's own hand.

After the ceremony Mr. Painter, his wife, son and daughter were entertained to luncheon, at which they were joined by the Lord Lieutenant, Capt. H. K. Oram (Controller of Board of Trade and Ministry of Supply), His Worship the Mayor of Swansea (Councillor D. J. Fisher, J.P.) and other guests of the Waunarlwydd management.

The McIntosh Follies

The lives of many old and infirm people in Dundee and the surrounding counties have been brightened by a troupe of entertainers whose guiding spirit is Mrs. A. McIntosh of Fyffe and Co.'s office staff.

Mrs. A. McIntosh

The prime object of the McIntosh Follies concert party is to take entertainment to those members of the community who by reasons of age, illness or infirmity cannot leave the precincts of the hospital or old peoples' home in which they live. The Follies have been offered many professional engagements, but they only accept the minimum number necessary to enable them to carry on with their good work free of financial embarrassment. Proof of the concert party's standing is the fact that it has put on shows at the beach hall in the popular seaside resort of Carnoustie during the summer season.

Thirty-two entertainers appear with the Follies. Several

of them are Fyffe employees besides Mrs. McIntosh, who is the organiser and accompanist. Mr. H. Reilly is the comedian, and from all accounts a very talented one. Messrs. W. Carrie and Peter McCabe are two fine tenors, and Miss J. Farquharson, an elocutionist whose successes have recently been listed in the *Magazine*, occasionally assists. Miss C. Taylor appears in the young ladies' choir, and there is a possibility that the choir may broadcast some time in the future.

NOBEL DIVISION

B.E.M. Presented

The Lord Lieutenant of the County, Commander G. H. Hughes-Onslow, visited Ardeer on 10th March to present the British Empire Medal to Mr. Tom McCall.

Dr. A. C. Richardson (works manager, Ardeer) presided at the ceremony, which was held in one of the rooms in Africa House. Commander Hughes-Onslow said he was happy to make this presentation of the British Empire Medal, an honour of no mean distinction because there had been only three other such awards in Ayrshire in the last few years. Mr. McCall

Mr. Tom McCall with the Lord Lieutenant of Ayrshire

had been chosen for this honour because of excellent work well done in prominent service over many years. "I am here on Her Majesty's behalf to hand over this medal, which is inscribed 'For God and Empire for meritorious Service'," Commander Hughes-Onslow said. He then read a letter from the Queen regretting her inability to hand over the medal personally but sending wishes for future happiness.

Salmon approves 'Ardil' Effluents

The appearance of a lively salmon in the Cargen Pow, a tributary of the Solway, just at the discharge point of an effluent pipe from the 'Ardil' factory, has brought pleasure even to those who are not interested in fishing.

The salmon proved beyond doubt that the elaborate treatment of effluent from the 'Ardil' factory was justified and that nothing from the factory could poison fish in the little river that flows past it to join the Solway.

The Dumfries factory has to treat two kinds of effluent, and it deals with these in different ways. After effective treatment both effluents are discharged into the Solway, one directly into the Cargen Pow and the other by pumping through an 8-mile-long pipeline to a settling tank at Overton. The settling tank is discharged into the Solway fifteen minutes after the ebb tide has started. Released by a lunar valve, the effluent is swept by the swiftly receding tide far into Solway Firth.

Before this effluent is pumped to the storage tank eight miles away it is neutralised with a lime slurry.

Treatment of the second effluent is a more difficult problem. As it leaves the process it contains some sulphuric acid, inorganic salts and some formaldehyde. Into the stream of waste liquid lime slurry is fed, which neutralises the acidity. A short distance downstream a special meter measures the efficiency of the neutralising process and automatically regulates the addition of the slurry to produce the right result. After leaving the meter the now slightly alkaline effluent runs through a brick labyrinth and thence into a settling pond with a cone-shaped bottom. Here all suspended solids settle out, and the clear fluid overflows into a trough. All sulphuric acid is now gone, but some formaldehyde remains.

Formaldehyde would be very bad for fish. The clear effluent is therefore pumped through spray arms which revolve over filter beds of whinstone chips.

In the beds colonies of bacteria have been cultivated. These bacteria need a regular supply of formaldehyde to keep them in good shape. As the effluent percolates through the whinstone beds the bacteria remove all the formaldehyde. When it comes from this ingenious process the effluent is quite harmless and is safely discharged into the Cargen Pow.

Thus the Dumfries factory makes a big contribution towards preserving the valuable fishing qualities of the Solway and its rivers.

Mr. J. M. King

Ten years ago Mr. J. M. King retired after a career with Nobel's and I.C.I. which was full of years and accomplishment. The news of his death on 17th March was received with widespread regret.

In 44 years of active service, in which he came in contact with many men, he had no enemies. Indeed, it can be said confidently that all who met him became his friends. He had a wide tolerance and a kindliness of manner which reflected exactly his deep interest in people and their affairs.

Mr. King began his long service in April 1900, when he joined Nobel's Explosives Co. in their West George Street office. He soon showed his qualities and became secretary of the company, a post which brought him into close touch with men who were later to make a big contribution when I.C.I. was formed. Indeed, he was himself one of those men.

When in 1921 Nobel Industries opened its new headquarters in London Mr. King moved south and there did much good work, especially after the merger which gave birth to I.C.I.

In the new company the work he undertook was exactly suited to his abilities and sympathy. He was the first secretary of the Staff Pension Fund, and he became head of the Pension and Assistance Funds Department. That task he accomplished with easy distinction, and he was still head of the department when he retired in 1942. His work for the Company was not finished. In the difficult war years he became personnel director of Nobel Division (then the Explosives Group).

During his two years in this post members of the staff and foremen soon learned to know, respect and have an affection for one who was shrewd but always generous in his judgment and advice.

His years of retirement were spent in Edinburgh, but they were not years of isolation from his friends. Frequently Mr. King joined them at social functions and enjoyed the company of his colleagues once again.

Nine Times Champion

In the picture above Mr. Neil Byars of Ardeer Recreation Club is seen in the process of becoming Ayrshire individual draughts champion for the ninth time. His opponent is Mr. R. Stirling, a retired telephonist from Ardeer.

Last year Mr. Byars, a fitter in Ardeer Factory, was a finalist in the Scottish individual draughts championship. His record in the Ayrshire championship is the best since the championship began in 1864.

Unexpected Holiday

Mr. Adam Hamilton (Safety Fuse Dept. Laboratory, Ardeer) is going to Switzerland in late June and early July for a holiday he did not expect. He and his wife are to have a thoroughly good time when the World Cup soccer matches are on, and the trip will not cost them much. Here is how it all happened.

Passing a leisure half-hour one evening, Mr. Hamilton filled in some entries in the *Daily Record* football competition. There was a list of qualities which had to be placed in order of decreasing importance. These qualities made the perfect footballer. Some knowledge of the game and a touch of luck might win a prize.

"If I win, would you come with me?" he asked his wife as he sealed the envelope.

Some weeks later, when her husband was at work, a press car with cameraman and reporter called. That was the first sure hint that Mr. Hamilton's entry had won the top prize.

What his success means is a luxury holiday for two in Switzerland, travel there and back, first-class hotels, organised sight-seeing, and stand tickets for the World Cup games. In addition there is £50 spending money in the prize.

"A nice break!" says Mr. Hamilton. He has worked in Ardeer Factory for 44 years, and he is keen on football.

SALT DIVISION

Historic House-moving

This month the Division headquarters move to Vale Royal, a mansion in Winsford on a site with a history dating back to 1277.

The present house, largely built in early nineteenth-century and Victorian times, has little in its appearance to suggest the early history of the site. Vale Royal was originally a monastery, founded by Edward I. He laid the foundation stone of the high altar in 1277, but the abbey was not completed until 1350, having cost (in terms of the present value of the pound) £2½ million.

Not the least important of the Abbey's possessions were salthouses in Northwich and Middlewich. Life for the tenants of abbey land was extremely hard, and there was constant friction between them and the abbot and his monks. One instance is recorded of an infuriated family falling on a monk, murdering him, and playing a gruesome game of football with his head. One abbot was brutally murdered in 1437 by a band of armed men who laid in ambush for him.

Vale Royal, Salt Division's new headquarters

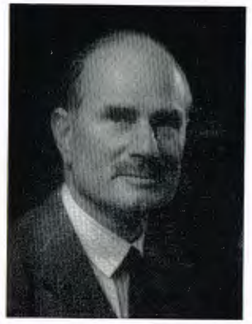
When the monastery was dissolved the Vale Royal estate passed to Sir Thomas Holcroft, and later to Lady Cholmondely. During the Civil War the Cholmondelys sided with the King, and Vale Royal was the scene of some fierce fighting. Cromwell's soldiers plundered the house and burned part of it.

The remnants of the original house fell victim to nineteenth-century "improvements." Of the abbey, all that remains are a few stones, and a mysterious nun's grave which should provide the new owners of Vale Royal with the starting-off point for many good ghost stories.

WILTON WORKS

Retirement of Dr. Armit

After 30 years' distinguished service with the Company, Dr. J. W. Armit retired at the end of March. He was the first chairman of Wilton Council, and had held this post for eight years. He is succeeded by Mr. C. M. Wright from Billingham Division.



Dr. J. W. Armit

Those who have worked with Dr. Armit for these eight years will long remember his many outstanding qualities. The organisation and layout of Wilton are the physical tokens of his largeness of mind and foresight, but it is his thoroughness, and high standards in everything he did, backed by a phenomenal memory and acuity of mind, which they will probably remember best. Nothing has ever been too small for him to do if it was his job to do it, and he has never been a man who, to save himself trouble, rubber-stamped the decisions of others.

A good example of his way of doing things which has much struck those few who, from their job, know of it has been on the fortunately rare occasions when people have been in trouble. Quite unknown to the individual, he has spared no effort to satisfy himself that all that could be done was being done to help them.

Another side of this thoroughness and hard work given to all that he does has been seen at the Wilton Recreation Club. Whenever he has been asked to speak, and on whatever occasion, Dr. Armit has always put the same effort and hard work into preparing what he is going to say and in seeking out some new and unworn ideas and expressions.

Dr. Armit has done many things because they were things which he, as chairman of the Wilton Council, felt obliged to do, and yet in the doing of them he generated in himself so much enthusiasm and interest that he did them for their own sake. He joined the Chamber of Commerce and the Tees Conservancy Commission, and he interested himself in the local government affairs of the district, originally because of his sincerely held feeling that I.C.I. must not stand aloof from the life and affairs of the district; but he very soon identified himself in the fullest detail with the objects of the various bodies he joined: he knew their history, and he knew the men with whom he was working. Another cause to which he gave a particular interest was the Boy Scouts, of whom he is a local president.

And yet it was always Wilton to which he gave most of his time and energy. Above all, and always, it was Wilton which occupied his heart and mind. Works councillors knew and understood his very real interest, exemplified in his address to each meeting of the Site Council which were always the fruit of much special thought. But if there was anything which above all attracted him, it was the Works Recreation Club, which he visited so often with Mrs. Armit, with such obvious interest. The thriving state of the Recreation Club is due to the work of many people, and they would be the first to acknowledge what they owed to the consistent support of the chairman.

Dr. Armit joined the Company as a research chemist with Nobel's Explosives in 1923. In 1929 he was appointed to Head Office Technical Department and became secretary of the Technical Executive Committee in 1938. During the war he was seconded to the Ministry of Supply as Director-General of Explosives and Chemical Supplies and returned to the Company as chairman of the Leathercloth Division in 1945. He was appointed chairman of the Wilton Council in 1946.

Award for Bravery

One day last summer Mr. Fred Blackburn (Instruments Construction) saw a girl in difficulties in the sea at Saltburn. The tide was on the turn, with a strong undertow running, and

Mr. Blackburn (right) receives a bravery certificate from the Mayor of Middlesbrough

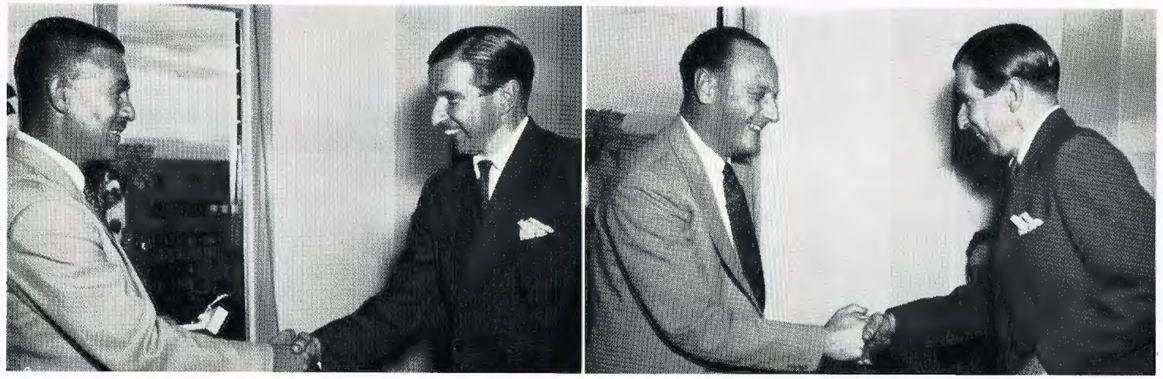
she was signalling for help. Mr. Blackburn swam out to give her assistance, battling against a strong current, and reached her just before she became unconscious. A boat came alongside and took the girl safely back to shore.

In February the bravery of Mr. Blackburn's action was recognised when he was presented with the Royal Humane Society vellum certificate by the Mayor of Middlesbrough, Alderman T. Meehan. The presentation took place at the annual meeting of the Royal Life-Saving Society (North and East Yorkshire Branch) at Middlesbrough town hall.

I.C.I.A.N.Z.

Ex-service Couple at Royal Parade

When the Queen inspected a parade of 80,000 ex-service men and women on Melbourne cricket ground during her tour of Australia, one of the guard of honour was an I.C.I.A.N.Z. man, Mr. R. B. Osborn.



Mr. George Mason presents long service awards to (left) Mr. Harris and (right) Mr. Woolley in Johannesburg

Wearing the D.S.O. and D.F.C. he won as a squadron leader in R.A.F. Bomber Command during the war, Mr. Osborn was unique among the members of the guard of honour in that his wife, a former W.A.A.F. officer, was also present, standing next to him and wearing her two service medals and the insignia of a mention in despatches.

Mr. and Mrs. Osborn

Mr. Osborn is assistant editor of the *I.C.I.A.N.Z. Magazine*. Until he went to Australia in 1950 he was in the Production Department at The Kynoch Press, Birmingham.

I.C.I. (SOUTH AFRICA)

Long Service Awards

At a ceremony at the head office of I.C.I. (South Africa) in Johannesburg recently two members of the staff received awards for 20 years' service.

They were Mr. R. H. Harris, who is manager of the Rhodesia office, and Mr. A. J. Woolley, who is deputy General Sales manager of the company at Johannesburg. The presentations were made by Mr. George Mason, head of African Department and a director of I.C.I. (South Africa).

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BINDING OF 1953 MAGAZINES

As in previous years, The Kynoch Press have agreed to bind the 1953 *Magazine* for those members of the Company who would like this done. The cost of 12s. 6d. per volume includes the provision of an index for 1953, which is now being prepared. Inserts can be bound with the *Magazines*, but these—together with the set of *Magazines*—must be provided by the person placing the order.

All those requiring their *Magazines* to be bound are asked to tell their *Magazine* correspondent now. The work of printing the indexes and preparing the binding cases must be started soon, and it will not be possible to accept orders later in the year.

OUR NEXT ISSUE

In the June issue we are starting a new feature of monthly gardening notes written by N. P. Harvey of Plant Protection. Readers will be familiar with Philip Harvey's writing, as three or four articles from his pen have been published in the *Magazine* in the last few years. He is himself a keen gardener and best known perhaps as an authority on roses. His book on roses published a year ago is already in its second edition.

Our leading article deals with the selling side. How does I.C.I. manage to keep up a home sales turnover of the order of half a million pounds a day? This is the theme of an article on the industries that buy our products, written by J. H. Townsend, deputy sales controller.

Of the other three articles in the *Magazine*, the first is written by a member of the Irish Salt Co. who worked for many years in a racing stable. He tells the inside story of the routine of training a winner from the moment that a colt first puts its nose inside a trainer's yard.

The colour feature is on the Wilton Power Station, one of the most up to date in Britain. And the last article is by Mrs. Anne Drinkwater. It is the story of how she has adapted herself to the new life of a pensioner after 27 years' service with I.C.I.

CORRECTION. *In the Information Note "Du Pont and I.C.I. Divide Interests" in our March issue the words lightning fasteners should have been printed thus: 'Lightning' fasteners.*

Life Is Good In Spain

By A. H. Allsopp (Metals Division)

After Sunday lunch the hand-tamed apron-stringed English husband applies himself assiduously to his washing-up. His Spanish counterpart has repaired to the local café, where, contemplatively absorbed in stirring his coffee, he reflects with eminent satisfaction upon the infinite goodness of life. . . .

THE 260-mile journey from Toledo to Granada had, with changes, taken nearly twenty-four hours. The wooden-benched railway carriage lurched clumsily to a halt, and the English student, uttering various imprecations upon the vicissitudes of third-class travel in Spain, was precipitated, bag and baggage, on to the station platform.

Spaniards themselves bear no malice towards their funereal railway system and seem, in their fatalistic way, agreeably surprised that they should reach their destination at all. Jocular, hearty and communicative, they are for ever pressing sandwiches and fruit upon the stranger and inviting him to take a swig from the *bota*, or wine-filled goatskin gourd. Cheerful conversation and an occasional song further relieve the tedium of travel, and at length the journey's end is reached.

As I stepped out into the warm April sunshine and breathed the soft, delicious air, all thoughts of Birmingham, a grey blob a thousand miles to the north, receded before the prospect of life in this loveliest of southern Spanish cities. Olive groves, orange blossom, fine Moorish palaces and snow-capped mountain ranges—this was the Granada setting, and one that embraced over two months of a half-year's residence in the vast and varied Iberian panorama.

My first concern was to find accommodation. Ignoring the advice of the myriads of small boys that thronged about and badgered me, I eventually decided upon the Pension J——. It lay in one of the oldest and most picturesque parts of Granada, and like many houses of southern Spain, it enclosed in its centre a small, rectangular courtyard or *patio* open to an azure sky and decorated with ferns and a constantly playing fountain.

These houses of Andalusia have no carpets, and the floors are not wooden but of tiles throughout. This, while making for a delightful coolness during the hot days, can occasion no little discomfort during the short but extremely severe winters. There is no recognised form of heating in southern Spain other than the *brasero*. This is a great copper pan of red-hot embers and is deposited under the table around which you are sitting. The *brasero* is not exactly the most felicitous of inventions, since it has the effect of roasting your knees while your back remains frozen. Fortunately, during most of the year there is little call for this interesting device.

My arrival at the pension had awakened a certain curiosity, as the foreigner does not abound in the ordinary boarding house and a "mad Englishman" anywhere is a sight not to be missed. Upon discovering that even Englishmen are human they were most amicable, and lavished hospitality to a degree that became embarrassing.

Breakfast is rarely provided at *pensiones* in the south, and my new friends introduced me to the *desayuno de churros*. *Churros*, quite simply, are strips of dough fried in olive oil. The dough is poured into a gadget resembling an icing syringe, only much larger, and is then squibbed out in one great coil into a pan of smoking fat and cooked until crisp and golden. The *churros* are then lifted from the pan with long skewers, broken into strips, wrapped and sold. Leaving the churros shop, or *churrería* as it is called, the customer makes for the nearest café, where, laying his twopenny bag of *churros* on the counter, he orders coffee. When this is served, breakfast is begun, the *churros* being dipped in the coffee to flavour them.

Out in the streets life is a curious mixture of the old and the new. Clanging street-cars and sleek limousines jockey

for position with the antiquated donkey cart; on the pavements the blind continue to sell lottery tickets for a living while a zealous policeman fines jay-walkers fivepence for each offence.

Through the twisting thoroughfares I would wend my way to the university. Stately and imposing, it was quadrangular in form and contained a delightful garden in its centre. It had formerly been the residence of a nobleman and still retained an air of ancient grandeur. The light, spacious lecture rooms, though not luxurious, were furnished with a simple elegance. The lofty walls were of white plaster and light oak panelling, and at the head of the room, behind the lecturer's chair and immediately above it, hung a plain oaken cross.

Spanish education is rather broader than the English. More subjects are studied at school and university than in this country, though less exhaustively. Spaniards have a natural culture, and this quality in no way seems the monopoly of a certain social class or set. The shop-girl who has read translations of Dickens and Jane Austen, like the barman poet and art connoisseur, is by no means an unqualified rarity.

In technical education Spain lags far behind England, facilities for this and the money needed to establish the facilities being sadly lacking. This "backwardness" has not proved entirely so disadvantageous as might be supposed. Sanitation in most big towns is excellent, and a Sunday postal delivery is almost universal. Moreover, Spain is in debt to no foreign nation and is one of the few countries in the world with a dollar surplus.

At Granada University the day's lectures finished at 1 o'clock. As lunch is rarely taken before 2 o'clock, the student has an hour in which to promenade in the dazzling sunshine, and if his route lies past a *bodega* or wine shop, he may be tempted to enter.

Wine is remarkably cheap and exceedingly good. Unfortunately the delicious natural local wines cannot be marketed abroad, as the slightest journey upsets them. At one *bodega* sweet red wine was sold at 1½d. a tumbler, and for another 2d. a bagful of roasted almonds could be bought. For 11d. something more substantial could be had: a glass of good white wine and a small lobster, the barman issuing customers with mallets with which to crack the shell.

One's appetite thus tickled, lunch is begun. I will not torture the poor, austerity-weaned English digestion with an exhaustive description of this gargantuan repast. At the pension lunch would probably consist of stuffed olives, a vegetable stew, a dish of *boquerones* (a large type of anchovy), steak and chips, and dessert. A hotel will provide more elegant fare such as the following, sampled in Madrid: *Gambas* (giant prawns) and salted almonds, galantine and tomatoes, *paella* (a dish of spiced rice, chopped meat and small shell-fish served in their shells), chicken cooked in wine and crisp young lettuce, a chocolate blancmange, dessert and coffee. It should be noted however, that differences in charges at pension and hotel were considerable (5s. a day at the former and £1 a day at the latter, inclusive).

After lunch, during the hottest part of the day, comes that most excellent of all Spanish institutions, the *siesta*. Let it be clear at once that after a heavy lunch a two hours' rest is indicative not of laziness but of sheer physical incapacity for anything more energetic.

Arising at 5 o'clock, the Spaniard in company with his friends will take his evening walk, usually up and down the main thoroughfare. Though many Spaniards are extremely poor, it is interesting to note that nearly all contrive to appear well dressed when out of doors. In this respect Spanish men and women are far smarter than their English and French counterparts, although one must remember that owing to the constantly fine weather good clothes may be worn without the risk of getting them ruined in a sudden rainstorm. The *paseo*, as the walk is called, amuses the Spaniard until suppertime. Sunday evenings, however, offer counter-attractions, since it is then that bullfights are fought and league football matches played.

The English game, still a relatively recent importation, enjoys a great popularity and commands a wider following than the national sport. It is played as yet with more zest than skill, although Spaniards are always gleefully reminding the English visitor of Spain's victory over England at Rio.

At the bullfight it is dearer to sit in the shade than in the sun, and the price of seats further depends on the spectator's proximity to the arena and whether the fight be classed as a *novillada* or a *corrida*. *Novilladas*, contested between novice toreros and young bulls, generally disappoint. *Corridas*, on the other hand, with star toreros and full-grown pedigree bulls, often prove a revelation of skill and beauty. Six fights constitute an evenings' entertainment, which lasts about two hours.

On the way home it is usual to visit the *bodega*, where the barman is chalking up details of the day's football results. A friendly chat over a convivial glass, and it is supper-time.

The evening meal, only slightly smaller than the midday one, is rarely eaten before 10 o'clock, and it is not until after this that the evening proper begins. Theatre shows and concerts, billed to begin at 11-30 p.m., traditionally start at least twenty minutes late and continue well into the early hours. In summer, performances are generally *al fresco* and are a brilliant social occasion, the display of flowers and evening dresses being truly superb.

As theatregoers arrive home at the time when most honest citizens are abed, they generally find their homes locked and barred. This is not done by the inmates of the house but by the *sereno* or night-watchman, whose duty it is to lock up every house after a certain hour. A brief handclap will summon this gentleman (usually of a venerable antiquity and vaguely resembling a Chelsea pensioner) to your assistance, and a small tip will procure admittance.

A typical street scene in the south of Spain

"The Englishman's home is his castle," runs a famous saying. Sometimes I feel it would be even more exact to say "the Spaniard's home is his castle," since it is here that jealously guarded family traditions are preserved and, under a rigorous family discipline, the elements of national character instilled.

Essentially an individual and not a type, the Spaniard conforms but little to the heel-stamping, guitar-strumming caricature which English music-hall audiences like to believe is the genuine article and which the Spaniards themselves have helped to create "because it keeps the foreigners amused." The true Spaniard has an immense capacity for enjoyment and shows it, but his sense of values remains always profound and immensely serious. He likes to take life leisurely but can be extremely industrious when the occasion demands. He is punctiliously correct over matters of etiquette, courteous, and dignified.

The Spanish woman is graced with a greater degree of beauty than the majority of God's daughters. Until recent times she had few interests other than those of the home, a fact which perhaps accounts in some small way for the scrupulous cleanliness and excellent cooking to be found in the average Spanish homestead. The latter is exclusively a feminine domain, and woe betide the hapless male who unwittingly intrudes upon that holy of holies, the kitchen at mealtimes. She will not think of allowing her menfolk to help in the house and considers it her right and privilege to wait upon them.

Thus, while after Sunday lunch the hand-tamed, apron-stringed English husband applies himself assiduously to his washing-up, his Spanish counterpart has repaired to the local café, where, contemplatively absorbed in stirring his coffee, he reflects with eminent satisfaction upon the infinite goodness of life.

"Train Spotters"

Photo by A. W. Caunt (Billingham Division)